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which 55 new species are described. The next largest genus is *Pothos*, with 48 species, 5 of which are new.—J. M. C.

BRAY<sup>6</sup> has published a description of the "sotol country" in Texas. The sotol is *Dasylirion texanum*, and gives name to characteristic areas of the arid southwest, whose vegetation is largely made up of plants of the cactus, agave, and yucca types. The general vegetation features of the country, the floristic elements, as well as the economic importance of the vegetation are presented.—J. M. C.

SEWARD has published descriptions of certain collections of fossil plants from Natal,<sup>7</sup> Victoria,<sup>8</sup> and Kashmir.<sup>9</sup> To be able to compare the floras and horizons of these regions with those of Europe and North America is looked forward to with great expectations, and every scrap of definite information is valuable.—J. M. C.

THE FOURTH PART of SCHNEIDER'S *Illustriertes Handbuch*<sup>10</sup> concludes Spiraeaceae, includes Rosaceae, and begins Drupaceae. There are forty-five text figures. The general character and scope of the publication are stated in the notice of the first parts (BOT. GAZETTE 39:373. 1905).—J. M. C.

## NOTES FOR STUDENTS.

THE LAST PAPER of GERASSIMOW<sup>11</sup> brings together concisely the principal conclusions of the interesting series of experimental studies on the cells of the Conjugales which have appeared in recent years. It will be remembered that by subjecting filaments of *Spirogyra* to a temperature at freezing point, or treating them for a short time to the anaesthetic influence of ether, chloroform, or chloral hydrate, GERASSIMOW was able to arrest the processes of mitosis at different stages, with the result that the protoplasm may become variously distributed in the daughter cells. (1) A daughter cell may be formed lacking a nucleus, but containing portions of the divided chromatophore in a peripheral layer of cytoplasm. (2) A single cell may contain the two daughter nuclei either separated

<sup>6</sup> BRAY, W. L., Vegetation of the sotol country in Texas. Bull. Univ. Texas no. 60. pp. 24. pls. II. 1905.

<sup>7</sup> SEWARD, A. C., Report on collections of Natal fossil plants. Second Rep. Geol. Surv. Natal and Zululand. Pp. 97-104. pls. 4-5. 1904.

<sup>8</sup> SEWARD, A. C., On a collection of Jurassic plants from Victoria. Records Geol. Surv. Victoria 13:155-210. pls. 8-19. 1904.

<sup>9</sup> SEWARD, A. C., and WOODWARD, A. SMITH, Permian-carboniferous plants and vertebrates from Kashmir. Memoirs Geol. Surv. India N. S. no. 2. pp. 14. pls. 8-10. 1905.

<sup>10</sup> SCHNEIDER, CAMILLO KARL, *Illustriertes Handbuch der Laubholzkunde*. Vierte Lieferung. Jena: Gustav Fischer. 1905. M 4.

<sup>11</sup> GERASSIMOW, J. J., Ueber die Grösse des Zellkernes. Beih. Bot. Centralbl. 18:45-118. pls. 3-4. 1904.

from one another or more or less intimately associated and perhaps wholly fused, depending upon how far the processes of mitosis have progressed before the cells have been subjected to the shock of the experiment. (3) Binucleate cells may continue their growth with subsequent mitoses, which when treated as before may give daughter cells with three and one nuclei respectively, or with two each or indeed a cell containing four nuclei. Furthermore, these nuclei may fuse with one another to give structures with a greatly increased chromatin content. (4) In place of the non-nucleated cells, there may be formed chambers containing cytoplasm and chromatophores, but without nuclei, which remain in open communication with the nucleated companion protoplast, because the cell wall is not formed entirely across the mother cell.

GERASSIMOW presents the results of his observations on these various types of cells in many elaborate tables and diagrams, with the following chief conclusions. (1) Cells which come to contain unusually large nuclei through the suppression of mitosis, or by the reuniting of partially divided nuclei, increase proportionally in size and their further cell division is postponed. The nuclei of such cells have of course the peculiarity of an increased amount of chromatin content. The large nuclei may later fragment into two or more structures which separate and may come to be at a distance from one another in the cytoplasm. The fragments finally lose their powers of reproduction and exhibit marked evidence of degeneration. (2) Cells which lack nuclei may form starch in the usual manner in the presence of light, and exhibit for a short time a weaker general growth than normal nucleated cells. The power to develop a gelatinous sheath also becomes markedly weakened. Finally there results a decrease in the volume of the cell, a fading of the chromatophore and conditions which lead to eventual death. (3) Chambers which lack nuclei but are in protoplasmic union with nucleated cells may be contrasted sharply with the non-nucleated cells. They exhibit a much stronger growth for a longer time and with a greater power to form starch, although not so marked as in the nucleated cells, and the chromatophores retain their color. There is also a conspicuous development of the gelatinous sheath.—B. M. DAVIS.

CORRENS<sup>12</sup> presents a continuation of his studies on *Mirabilis* hybrids in which he had found<sup>13</sup> red appearing as a new character in hybrids between two constant races having respectively white and yellow flowers. Instead of assuming, as does TSCHERMAK,<sup>14</sup> that there is a latent allelomorph for red in one or other of these races, and that this is rendered active on crossing, he considers the red color to be a modification of the yellow produced through the activity of a distinct character-unit present in the white-flowered race, the antagonistic characters in

<sup>12</sup> CORRENS, C., Zur Kenntniss der scheinbar neuen Merkmale der Bastarde. Zweite Mittheilung über Bastardierungsversuche mit *Mirabilis*-Sippen. Ber. Deutsch. Bot. Gesells. 23:70-85. 1905.

<sup>13</sup> See BOT. GAZETTE, 37:77. 1904.

<sup>14</sup> See BOT. GAZETTE 39:302 and 303. 1905.

the two races being: color *vs.* no color, and no modification *vs.* modification of the yellow color to red. Pigmentation inherited from the yellow parent and the modifying element inherited from the white parent are dominant, giving all red-flowered offspring in the first generation, and rose-yellow-white nearly in the ratio 9:3:4 in the second generation.

The results were further complicated by the presence in the white-flowered race of a nearly latent striping which became active on crossing and behaved approximately as a Mendelian character. The attempt to explain this character on similar grounds as the red color is less satisfactory.

CORRENS<sup>15</sup> has also studied the inheritance of the petaloid calyx in the *calycanthemus*-forms of *Campanula medium* and *Mimulus tigrinus*. The *calycanthemus*-form of the former he finds never produces seed but has good pollen, so that all of the "hose-in-hose" Campanulas are hybrids between the *calycanthemus* and typical forms. The expected Mendelian proportion,  $DR \times R$ , on the assumption that the hose-in-hose condition is dominant, is in this case 50 per cent. of each, and the result obtained was 44.5 per cent. to 55.5 per cent. hose-in-hose. The recessiveness of the typical form was further shown by the fact that when self-fertilized it produced 97.3 per cent. typical, the expected result being 100 per cent.

In *Mimulus tigrinus* both male and female germ cells of the *calycanthemus*-form are functional and the question of dominance could be more completely tested. It was determined that here also the hose-in-hose perianth is dominant over the normal. As the petaloid calyx is unquestionably a phylogenetically recent character, this result is the reverse of that expected from DEVRIES' law that phylogenetically older characters are dominant over newer. CORRENS suggests that the "higher" character dominates over the "lower," thus making DEVRIES' law apply only to retrogressive characters; but he also calls attention to several cases in which the "higher" character is obviously recessive, *e. g.*, the lacinate leaves of *Chelidonium majus laciniatus*, and the yellow color of flowers in the cross of *Polemonium coeruleum album* with *P. flavum*. As most varieties are retrogressive, the views of CORRENS and DEVRIES would equally fit the facts in a majority of cases.—G. H. SHULL.

ITEMS OF TAXONOMIC INTEREST are as follows: E. L. GREENE (Torreya 5:99-100. 1905) has described 3 new species of Ptelea.—L. M. UNDERWOOD (*idem* 106-107) has described a new Californian species of Botrychium.—B. F. BUSH (Ann. Rept. Mo. Bot. Gard. 16:87-99. 1905) has revised the N. Am. species of Fuirena, recognizing 8 species, 2 of which are new; has described (*idem* 100-101) 2 new Texan species of Tradescantia; and in conjunction with K. K. MACKENZIE has described (*idem* 102-108) new species from Missouri under Sagittaria, Heuchera, Convolvulus, Dasystoma, Xanthium, and Senecio.—W. W. JONES (Proc. Amer. Acad. 41:143-167. 1905) has revised the genus Zexmenia,

<sup>15</sup> CORRENS, C., Einige Bastardierungsversuche mit anomalen Sippen und ihre algemeinen Ergebnisse. Jahrb. Wiss. Bot. 41:458-484. 1905.

recognizing 42 species, 6 of which are new.—C. H. KAUFFMAN (Bull. Torr. Bot. Club 32:301-325. *figs.* 7. 1905) has published a preliminary study of the genus *Cortinarius*, illustrated by half-tones from excellent photographs, in which, after a full description of the structure of the various parts, 7 new species are described.—E. L. GREENE (Pittonia 5:205-308. 1905) has published a revision of *Eschscholtzia*, recognizing 112 species, 88 of which are new, thus breaking up what seems to have been a great aggregate of species collected under a few names; has published *Petromecon* as a new genus of Papaveraceae from Guadalupe Island, founded on *Eschscholtzia Palmeri* Rose and containing a new species; has presented a synopsis of *Dendromecon*, recognizing 17 species, 14 of which are new; and has suggested an extension of species under *Sanguinaria* by separating 4 new species from what has been treated as a monotypic plexus.—C. A. M. LINDMAN (Arkiv. Bot. K. Svenska Vetensk. 3: no. 6. pp. 14. *figs.* 10. 1904; rev. in Bot. Centralbl. 98:659. 1905) has published a new genus (*Regnellidium*) of Marsiliaceae from southern Brazil, which combines certain features of the two other genera with characters of its own.—M. L. FERNALD (Rhodora 7:129-136. 1905), in continuing his presentation of the N. Am. species of *Eriophorum*, has discussed the generic status of *Eriophorum* and the status of the names *E. Chamissonis* and *E. Callitrix*.—J. M. C.

FITTING'S<sup>16</sup> full paper has recently appeared; an abstract of his preliminary report may be found in the January GAZETTE of this year. It is difficult to find an unnecessary paragraph among the one hundred seventy-five pages of this notable paper. Considerable ingenuity is displayed and this accounts for the author's success in reaching a much closer analysis of geotropic phenomena. Part I contains eight chapters exclusive of introduction and recapitulation. Description and explanation of apparatus constitute the first chapter. Elaborate cuts and diagrams contribute to a very clear presentation. Particularly satisfying is the second chapter, because here is answered the very fundamental and much controverted question of optimum position. CZAPEK's answer of 135° deviation from position of normal equilibrium is proven incorrect, and the horizontal position of 90° deviation is demonstrated to be the optimum position for the plants tested. The variety of the latter is great enough to make a general statement for parallelotropic organs very probable. Positions at equal angles above or below the horizontal afford equal stimulation. The latter conclusion has already received confirmation in that the contrary conclusion of NEWCOMBE has been withdrawn, and evidence presented by him to support the author. Moreover the intensity of stimulation as determined by position varies approximately as the sine of the angle of deviation. In Part II the investigation endeavors, on the basis of demonstrations in Part I, to penetrate further the complicated processes involved in perception and response. Admirable caution is here manifest, a clear discrimination between demonstration and probability being maintained. The author

<sup>16</sup> FITTING, HANS, Untersuchungen über den geotropischen Reizvorgang. Teilen II. Jahrb. Wiss. Bot. 41:221-398. 1905.

is inclined to regard sensitiveness to gravitation far greater than hitherto supposed, even as much as to light. It is not at present considered possible to determine the time required for an organ to recover from stimulation, since the autotropic straightening merely indicates expiration of reaction. Other important conclusions are stated in the abstract mentioned.—RAYMOND H. POND.

NUCLEAR DIVISION in *Fritillaria imperialis* has been studied by SIJPKENS,<sup>17</sup> who uses a somewhat novel method. Material is fixed in Flemming's stronger solution for three weeks, after which it is thoroughly washed in water and run up to 96 per cent. alcohol. A piece of parietal endosperm with its nuclei is now brought into 6 per cent. celloidin, where it is kept an hour or so longer, care being taken not to let the celloidin become hard. With a pipette the piece with some celloidin is taken up and placed upon a cover glass where the celloidin flows out, forming a delicate film, which in a few minutes becomes rather tough. The film is moistened with 96 per cent. alcohol until it is easily separated from the cover. Stain in gentian violet, clear in origanum oil for two hours, imbed in paraffin, and cut sections about  $2\mu$  in thickness; then stain again in gentian violet.

Another method was also used. A piece of the parietal endosperm was brought into a drop of 50 per cent. chromic acid, which soon dissolves the protoplasm away from the nuclei. The nuclear membrane itself dissolves soon after, leaving only the chromatic network, which is washed in water and then stained with gentian violet.

From a study of such preparations SIJPKENS concludes that the reticulum of the resting nucleus is an anastomosing network with thick, irregular knots. There is no linin thread, with chromatin granules, but the network is a homogeneous structure. The spindle arises inside the nucleus from protoplasm which has pressed into the nuclear cavity after the dissolution of the nuclear membrane. The threads reaching from pole to pole are formed first, the mantle fibers appearing later.—C. J. CHAMBERLAIN.

WITHOUT "hungering" for priority, FISCHER<sup>18</sup> shows wherein the theory of "blütenbildenden" substances, recently presented by LOEW, agrees closely with the author's view earlier expressed. Since neither LOEW nor the author have offered evidence more than enough to make the theory a rational hypothesis, the most important point to notice here is that the speculations of two independent writers lead to the same theory. The author's analysis is closer in that three kinds of *blütenbildenden* substance are distinguished, namely: *Formstoffe*, whose presence determines the habit or architecture of the plant; *Reizstoffe*, whose relative amount induces a tendency to reproduce at the expense of vegetation or *vice versa*. With SACHS, *Formstoffe* and *Reizstoffe* were identical; while accord-

<sup>17</sup> SIJPKENS, B., Die Kernteilung bei *Fritillaria imperialis*. Recueil des travaux. Bot. Neerl. no. 2. (repacked) pp. 58. pls. 4-6.

<sup>18</sup> FISCHER, HUGO, Ueber die Blütenbildung in ihrer Abhängigkeit vom Licht und über die blütenbildenden Substanzen. Flora 94:478-490. 1905.

ing to LOEW the latter would correspond to the author's *Baustoffe*, by which is understood substances which cause a differentiation of tissue, as into vegetative and reproductive. Such *Reizstoffe* arise or become governing under abnormal conditions and imply a disturbed equilibrium in the plant; while *Baustoffe* are normally active. Thus to an excess of carbohydrates caused by conditions favorable to photosynthesis (abundant light and little moisture), but unfavorable to vegetation (reduced absorption), the author attributes an overproduction of flowers.—RAYMOND H. POND.

THE ADDRESS GIVEN by Professor GOEBEL last year at the Congress of Arts and Science in St. Louis has been translated by Professor F. E. LLOYD and published in *Science*.<sup>19</sup> The subject was an assigned one, but could not have been more appropriate to the man and the occasion. The time was limited, so that the speaker was able only to outline rather than to develop his ideas; but the paper contains a statement of the relations between the old or formal morphology, phylogenetic morphology, and experimental morphology, from the standpoint of one of our most philosophical botanists, that will be illuminating and suggestive to many. All of the speaker's views may not be accepted by all, but that he has indicated the most needed direction of morphological investigation in the immediate future can hardly be doubted.—J. M. C.

BOLLEY<sup>20</sup> has announced that he has at last established definitely the fact that the uredospores of a number of rusts, including those of *Puccinia graminis*, can endure the winter uninjured. They were found successfully surviving upon dead leaves, dead straw, etc.; those of *P. graminis* remaining unimpaired when exposed to the drying winds of autumn and to the intense cold of a North Dakota winter. The uredospores of *P. rubigo-vera* were found wintering freely in Mississippi, Texas, Illinois, Minnesota, and North Dakota, both upon living matured leaves and straw. The inference is drawn that although the aecidium stage may be a physiological necessity for the perpetuation of the species, its annual recurrence is not a necessity.—J. M. C.

COCKAYNE<sup>21</sup> has studied the vegetation of the Open Bay Islands, two small islands three nautical miles from the coast of New Zealand (South Westland). The most important vegetation consists of thickets formed by lianes. The conclusion is reached that "when attached to the mainland the present islands must have been occupied by subtropical evergreen rain-forest similar to that now existing on the adjacent coast. After separation, as the area of the islands became smaller and smaller, and the climatic conditions more and more severe, only those plants specially adapted to such conditions could survive, and of these certain of

<sup>19</sup> GOEBEL, K., The fundamental problems of present-day plant morphology. *Science* N. S. **22**:33-45. July 14, 1905.

<sup>20</sup> BOLLEY, HENRY L., New work upon wheat rust. *Science* N. S. **22**:50-51. 1905.

<sup>21</sup> COCKAYNE, L., Notes on the vegetation of the Open Bay Islands. *Trans. N. Z. Inst.* **37**:367-375. *pl.* 23. 1905.

the lianes, although most highly specialized forest plants, are the most suitable.—J. M. C.

RAMALEY<sup>22</sup> has continued his comparisons of the anatomy of cotyledons with that of leaves by giving an account, with illustrations, of the "foliaceous" cotyledons of eight species of tropical plants: *Jatropha curcas*, *Manihot glaziovii*, *Eriodendron anfractuosum*, *Bombax malabaricum*, *Couroupita guianensis*, *Ipomoea coccinea*, *Solanum quitense*, and *Cosmos bipinnatus*. The conclusion is reached that these observations confirm the author's view, previously published, that cotyledons and leaves "are not really of the same nature."—J. M. C.

UNDERWOOD<sup>23</sup> has done good service in working out the itinerary of CHARLES WRIGHT's three explorations of Cuba. His sojourn in Cuba covered a period of nearly ten years, 1856 to 1867; but his travels were confined chiefly to the two ends of the island, leaving the great central portion largely unexplored.—J. M. C.

SHELDON<sup>24</sup> has announced that as a result of cultures and inoculations he has reached the conclusion that in all probability the bitter rot of the apple, the ripe rot of the grape, and the anthracnose of the sweet pea are caused by the same fungus.—J. M. C.

THE FULL PAPER by SCOTT<sup>25</sup> on a new type of strobilus in *Sphenophyllum* has appeared. A notice of the preliminary announcement, containing a summary of the results, was published in BOT. GAZETTE 39:76. 1905.—J. M. C.

CHRYSLER<sup>26</sup> has shown that through the agency of man in planting conifers upon a bare area at Woods Holl, Mass., the second stage in reforestation—that of the oaks—has been nearly attained in fifty years.—J. M. C.

RECENT FLORISTIC PAPERS are those by KRAUSE<sup>27</sup> on the flora of Aden; and by VAHL<sup>28</sup> on the flora of the Madeiras.—J. M. C.

<sup>22</sup> RAMALEY, FRANCIS, A study of certain foliaceous cotyledons. Univ. Colorado Studies 2:255-264. figs. 42. 1905.

<sup>23</sup> UNDERWOOD, LUCIEN M., A summary of Charles Wright's explorations in Cuba. Bull. Torr. Bot. Club 32:291-300. map. 1905.

<sup>24</sup> SHELDON, JOHN L., Concerning the identity of the fungus causing an anthracnose of the sweet pea and the bitter rot of the apple. Science N. S. 22:51-52. 1905.

<sup>25</sup> SCOTT, D. H., On the structure and affinities of fossil plants from the palaeozoic rocks. V. On a new type of sphenophyllaceous cone (*Sphenophyllum fertile*) from the lower Coal-measures. Phil. Trans. Roy. Soc. London B. 198:17-39. pls. 3-5. figs. 3. 1905.

<sup>26</sup> CHRYSLER, M. A., Reforestation at Woods Holl, Massachusetts—A study in succession. Rhodora 7:121-129. pls. 62-63. 1905.

<sup>27</sup> KRAUSE, K., Beiträge zur Kenntniss der Flora von Aden. Engler's Bot. Jahrb. 35:657-662. 1905.

<sup>28</sup> VAHL, M., Ueber die Vegetation Madeiras. Idem 36:253-349. 1905.